Compatibility Determination

Title

Draft Compatibility Determination for Commercial Tree Harvesting at Moosehorn National Wildlife Refuge

Refuge Use Category

Agriculture, Aquaculture, Silviculture

Refuge Use Type(s)

Tree Harvesting (commercial)

Refuge

Moosehorn National Wildlife Refuge

Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

Moosehorn NWR was established on January 13, 1937, as a migratory bird refuge when the first parcel of land was acquired within the Baring Division. Though established for migratory birds, there was particular emphasis placed on the American Woodcock, and to this day the refuge is highly regarded for its research and demonstration of habitat management techniques that benefit that species. On July 1, 1937, President Franklin D. Roosevelt signed an Executive Order (Executive Order 7650) expanding the Baring Division by an additional 16,000 acres. The 10,880-acre Edmunds Division boundary was similarly established on August 30, 1938 (Executive Order 7967). Not all lands within the approved boundaries have been acquired.

Moosehorn NWR has the following official purposes:

1. "...as a refuge and breeding ground for migratory birds and other wildlife: ..." *Executive Order 7650, dated July 1, 1937*
2. "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." *16 U.S.C. 715d (Migratory Bird Conservation Act)*
3. "...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." *16 U.S.C. 460k-1 (Refuge Recreation Act)*
4. "...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations

contained in various migratory bird treaties and conventions..." *16 U.S.C. 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act of 1986)*

5. "... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." *16 U.S.C. § 742f (a) (4)* ... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ... *16 U.S.C. § 742f (b) (1) (Fish and Wildlife Act of 1956)*
6. "... conservation, management, and restoration of the fish, wildlife, and plant resources and their habitats for the benefit of present and future generations of Americans..." *16 U.S.C. § 668dd (a) (2) (National Wildlife Refuge System Administration Act)*
7. "... wilderness areas ...shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness: ..." *16 U.S.C. § 1131 (Wilderness Act)*

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System (Refuge System) is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (Pub. L. 105-57; 111 Stat. 1252).

Description of Use

Is this an existing use?

Yes. Commercial forest management has been conducted on the refuge since at least 1972. The use was evaluated in 1994 and again in 2010.

Commercial tree harvesting was an integral part of the Forest Management Plans that were approved and implemented on the refuge, and was most recently recognized as a management tool in the refuge's 2024 Habitat Management Plan (HMP).

What is the use?

Commercial tree harvesting would be used to achieve some of the biological goals and objectives described in the refuge's HMP (2024) (*https://ecos.fws.gov/ServCat/Reference/Profile/142371*) (Forest Management Plans for the Baring and Edmunds Divisions (ServCat - Plan - (Code: 142384 & 142385) (fws.gov)), and Fire Management Plan. Tree harvesting provides habitat for priority

species and sustains ecosystems that are resilient and biologically diverse. This use involves cutting and removing trees according to specific management prescriptions, and allowing forest products such as sawlogs, pulpwood, and firewood to be manufactured and sold from the harvested trees.

Per Service policy, commercial tree harvest is considered a "refuge management economic activity" (602 FW 2.6. N), which is "a refuge management activity on a national wildlife refuge that results in generation of a commodity which is or can be sold for income or revenue or traded for goods or services." As such, this use will only be authorized if we determine that "the use contributes to the achievement of the national wildlife refuge's purposes or the National Wildlife Refuge System mission." (50 CFR 29.1)

Is the use a priority public use?

No, commerical tree harvesting is not a priority public use of the National Wildlife Refuge System, under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997.

Where would the use be conducted?

This use could occur throughout the refuge (except the Wilderness Areas, and areas described below), including any future acquired parcels, as allowed by the refuge HMP. The refuge designates four management zones categorized by the degree of resource sensitivity. As sensitivity increases, the restrictions on forest management also increase.

The Low Resource Sensitivity Zone allows the greatest flexibility with managing for HMP objectives such as focal species, age diversity, and structural complexity while still using State standards for best management practices. The Moderate Resource Sensitivity Zone has more restrictive requirements that may include seasonal closures of operations, the maintenance of closed canopy conditions, or the retention of coarse woody material. The High Resource Sensitivity Zone is the most restrictive and allows very little management. This includes protective buffers along streams, vernal pools, lakes and ponds, and other resources of concern. The Industry Inoperable Zone includes lands where harvesting equipment cannot operate such as hydric soils and excessively steep slopes (Johnson 2003). Felling, girdling, and treating individual trees or small groups of trees to benefit wildlife or for safety reasons is allowed in the High Resource Sensitivity Zone and Industry Inoperable Zone where and when needed but commercial harvesting in these zones would be limited and avoided to the extent possible. Currently, the refuge includes approximately 24,500 acres of upland forests across all the zones.

When would the use be conducted?

Commercial tree harvesting may occur throughout the year but would typically be performed in late summer, fall, or winter seasons to minimize unwanted impacts to wildlife (especially breeding birds), soils (compaction or erosion), and roads. Harvesting since 1992 has occurred in the winter season on frozen ground but may shift to late summer and fall in response to recent trends of warmer and wetter winters. Periods of high public visitation and recreation will be considered and efforts to minimize impacts will be incorporated into the harvest plan. To the extent possible, the breeding periods of migratory birds will be avoided.

How would the use be conducted?

Commercial tree harvest, an important component of forest management, includes silvicultural methods designed to achieve the refuge's biological goals, while also incorporating practices that protect and promote important ecological values. Climate change and other threats are considered in the preparation of site prescriptions, which are developed by refuge staff to guide operations. In general, stands will be managed to diversify forest age class and structure to benefit focal wildlife species (Seymour and Hunter Jr. 1992, 2000; Kenefic and Nyland 2000; Keeton 2006; Foster et al. 2010). All harvesting will follow best forestry and wildlife management practices recommended by the Maine Forest Service (Maine Forest Service and Maine Department of Agriculture, Conservation & Forestry (2017).

Commercial tree harvesting activities will be directed by the refuge HMP and tailored to each habitat type. Where commercial tree harvesting is warranted, those activities are performed by a logging company operating under a special use permit (SUP). Project prospectus and specifications are forwarded to local and regional logging companies for competitive bidding or in some cases agreements with specific contractors may be negotiated to meet particular wildlife habitat needs. The refuge manager will select a company based on meeting qualifications and requirements in the project prospectus.

The refuge manager will issue the selected company a SUP. Active harvest operations may include felling trees, skidding them to a landing, processing the trees, loading logs or wood chips on trucks, and hauling the wood products offsite. Forest management treatments (e.g., trees targeted, spacing, residual tree density, harvest method, etc.) are dictated by a silvicultural prescription developed by the refuge to meet wildlife habitat needs.

Provisions listed in 50 CFR (subpart D-Permits, 25.41–45) regulate all activities under this SUP process. The permittee would be required to comply with all Department of the Interior, U.S. Fish and Wildlife Service (Service), and other Federal laws in the conduct of their business. Because this is an economic use of the refuge, it is also

subject to other applicable laws and regulations (see 50 CFR 29.1). We would continue to follow the procedures for SUPs outlined in the Service's Refuge Manual (5 RM 17.11) and other applicable laws and regulations (see also 50 CFR 29.1) when selecting permittees and administering this use.

Within a specific management unit, focal wildlife species will be identified and will act as drivers for active forest management. Where focal species-specific habitat conditions are missing, and may be created through active forest management, those areas will be prioritized for treatment.

Silvicultural treatments will be designed to meet wildlife habitat objectives within particular forest types (e.g., northern hardwood, spruce-northern hardwood, spruce-fir, etc.), while addressing site-specific operational constraints. Active management will help restore forest structure (Kenefic and Nyland 2000; Crow et al. 2002; Bryan 2003; Keeton 2006; Raymond et al. 2009; Arseneault et al. 2011) and species composition (Leak 1975, 2003, 2005; Arseneault et al. 2011), and improve the forest's resiliency to environmental stressors like climate change (Hines, Heath, and Birdsey 2010). Monitoring of forest systems and the impacts of commercial tree harvesting strategies would allow modification of management practices as necessary. Climate change may influence the trajectory of our forest systems in unpredictable ways, and adjustments to objectives and management strategies may occur.

Why is this use being proposed or reevaluated?

This use is being reevaluated per Service policy. Compatibility determinations are reevaluated at least every 10 years (603 FW 2.11 H.2).

During the Moosehorn HMP process, it was recognized that commercial tree harvesting was needed to achieve goals such as providing high-quality breeding habitat for migratory birds while sustaining biologically diverse and resilient forests. At that time, and continuing today, in some areas the refuge's forest condition lacks desired structural complexity, composition, and important habitat features. This is largely due to the management practices used before the lands were owned by the Service. Previous practices tended to focus on cutting trees based on market opportunities, which included only harvesting trees of a certain species, size, or quality based on market demand. As a result, the type of trees growing on certain sites shifted.

Such market-driven harvesting ignored modern forestry practices that are science-based and entirely motivated by achieving specific objectives for wildlife and ecosystem health. Restoration of Moosehorn NWR's altered systems requires an active, hands-on aproach guided by science-based methods. Unfortunately, reliance on natural forces to maintain forest communities representative of the area's soils and ecosystems is no longer feasible due to past significant human alterations.

Commercial tree harvesting can also create and maintain the appropriate forest structure, and age or size class distribution on the landscape so that suitable habitat is always available for priority species.

Availability of Resources

Moosehorn NWR lacks the funding, personnel, and equipment to effectively manage its forested lands alone; therefore, engaging private logging companies as part of a commercial tree harvesting arrangement is the only practical alternative for accomplishing this work necessary for meeting wildlife habitat management objectives. Additionally, the design and oversight of commercial tree harvest on the refuge requires specialized forestry expertise, which can be obtained through staffing, consulting, or partnering.

A portion of funds generated by the sale of trees harvested on refuge lands will go into the national revenue sharing fund. Another portion will fund additional forest management, including stand inventories, timber marking, pre-commercial thinning, related road maintenance, and plantings (if prescribed). When appropriate, infrastructure maintenance associated with timber sales, such as road maintenance, will be included as a deliverable in the SUP. This flexibility alleviates additional management costs associated with active forest management.

All harvesting and access to management areas is likely to occur near, or from, existing roads, which require substantial resources to perform essential maintenance. At times, modifications may be needed to accommodate logging equipment.

Expected annual costs to conduct a commercial tree harvest on the refuge are listed below. These costs are typically offset by revenues generated by the harvest but vary a great deal due to market conditions and the quality and size of the stand to be managed (see Table 1). The estimates in Table 1 were derived considering current rates for professional, licensed services if contracted outside the FWS. Annual costs may vary with changes in rates, scale, and complexity.

Table 1. Costs to Administer and Manage Commercial Tree Harvest.

Category and Itemization	Range of Annual Revenues	Recurring Annual Expenses
Forestry Consultant,		$3,000

inventory, implementation planning		
Harvest layout, marking paint, equipment		$10,000
Administer bid process, issue special use permit		$1,000
On-site representative during operations		$4,000
Post-harvest assessments		$1,000
Roadwork and close-out	--	$2,000
Revenues	$0 to $15,000 (average $5,000)	
Total expenses		**$21,000**

Anticipated Impacts of the Use

Potential impacts of a proposed use on the refuge's purpose(s) and the Refuge System mission

The effects and impacts of the proposed use to species and their habitats, whether adverse or beneficial, are those that are reasonably foreseeable and have a reasonably close causal relationship to the proposed use of Commercial Tree Harvesting. This CD includes a description of the environmental consequences on a resource only when the impacts could be more than negligible and therefore considered an "affected resource."

Wildlife species respond differently to forest management activities that include timber harvest depending on forest type and harvest intensity (Fredericksen et al. 2000). Even within groups of wildlife species (amphibians, reptiles, birds, mammals, etc.) the effects are variable and often species-specific. Many studies have demonstrated the importance of early-successional forest habitat for breeding bird abundance, composition, and diversity (Hanle et. al. 2020). Numerous declining forest bird species in Bird Conservation Regions (BCR) are reliant upon forest habitat with dense understory development, historically caused by local disturbances. For example, the Canada warbler, a species of conservation concern, is often found in mature forested habitat where tree gaps allow for the development of localized understory shrub and sapling development (Lambert and Faccio 2005). Forest management to simulate additional tree gaps will give the understory a chance to grow resulting in a positive impact for many bird species.

Short-term impacts

The construction and maintenance of roads and landings, and the operation of heavy

equipment could cause short-term soil compaction, rutting, or erosion (Helfrich, Weigmann & Neves 1998; Wiest 1998; Cullen 2005). This impact can worsen if operating on unfrozen or moist soils, which can have a longer-term impact. Impacts from compaction can include damage to roots and concentration of water on skid roads leading to erosion. However, harvesting will occur during times when soil is frozen or dry, which minimizes the effects of compaction and erosion. Further, specialized equipment and/or harvesting techniques will be used to limit the extent of ground where heavy equipment will travel. Even if these adverse impacts do occur, they will be short-term because regular freeze-thaw cycles and frost heaving negates minor compaction or rutting.

Poorly planned or executed commercial tree harvesting operations can have adverse impacts on water quantity and quality. Data from experimental forested watersheds in the eastern U.S. indicate that leaching of nutrients after timber harvesting, especially clearcutting, tends to increase (Bormann et al. 1968, 1974), while increases in stream temperature are highest where revegetation of harvested areas is delayed (Demaynadier & Hunter Jr. 1995; Cullen 2001). These factors may have detrimental effects on stream organisms, including fish, invertebrates, and amphibians (Campbell & Doeg 1989). Mitigation of these impacts is possible through careful planning and implementation, and therefore these effects are not expected at Moosehorn NWR. As described elsewhere in this document, the Refuge will employ management zones to protect water quality and sensitive resources, abide by best management practices, and consult with resource professionals.

Commercial tree harvest, which includes the construction of roads, creation of landings, and operation of heavy equipment, can create both localized and broader impacts on forests including damage to understory vegetation (Scheller & Mladenoff 2002), alteration of microhabitat environments (Demaynadier & Hunter Jr. 1995), changes in the abundance and type of coarse woody debris (Demaynadier & Hunter Jr. 1995; Siitonen 2001), and removal of snags important to wildlife. Mitigation of these impacts is possible through careful planning and implementation, and any effects are outweighed by the long-term benefits.

Endangered, threatened, and at-risk species are a critical consideration when planning and implementing commercial tree harvest as a component of forest management. All forest management that may affect listed species is subject to review and approval by the U.S. Fish and Wildlife Service's Ecological Services program. We do not expect any negative impacts to northern long-eared bat, tricolored bat, or Atlantic salmon because we will follow the stipulations outlined by Ecological Services designed to ensure habitat management does not negatively impact these species.

Commercial tree harvest operations may temporarily disrupt visitor access to some

areas, and parts of the refuge undergoing active forest management may be temporarily closed to ensure visitor safety. Trails and roads will either be closed or shared with log trucks when safe passage can be accommodated. Alternate routes will be provided when possible. Only a small proportion of the refuge will be closed at any one time so the impact to visitors will be short-term and minor. Operations will most often occur in remote areas where visitor access is already limited and during the winter season when most of the roads would normally be closed due to snow.

Long-term impacts

Commercial tree harvest will yield long-term, beneficial impacts for forest health, wildlife and plants. This form of management is specifically designed to restore forest structure and diversity to improve conditions for species and to help the ecosystem stay resilient in the face of climate change. There are possible minor adverse long-term impacts that will likely be avoided through conscientious planning and practices.

Poorly planned or executed timber harvests can affect water quality, alter surface and groundwater hydrology, and water storage capability. Impacts such as sedimentation into waterways, localized ponding, concentrated outwash, or drought can happen from inadequately placed or drained infrastructure and neglecting to fix erosion-causing problems such as rutting. These impacts can persist as is evident on some areas of Moosehorn NWR where management prior to Service ownership failed to use best practices for aquatic connectivity, water quality, or erosion control. Future operations will favor the use of existing infrastructure that is stable and has minimal or no impact, remedy infrastructure that is problematic, and keep new road construction to an absolute minimum.

Damage to uncut trees from heavy equipment may create entry points for invasion by insects or disease (Nichols, Lemin Jr. & Ostrofsky 1994). Less downed wood and fewer large-diameter logs are likely to accumulate under a short-rotation (less than 50 years) harvest, whole-tree harvests, and selection cuts than would occur under long rotations or in uncut forests, affecting soil moisture regimes and forest floor amphibians and small mammals (Gore and Patterson III 1986; Demaynadier and Hunter Jr. 1995). Harvesting may also leave remaining trees more susceptible to wind throw (Ruel 1995) and facilitate the spread of invasive plants (Sakai et al. 2001), which may have long-term implications on biodiversity if control measures are unsuccessful.

The long-term impacts on various refuge users are anticipated to be entirely positive as forest management may increase presence and therefore observation of bird and other wildlife species, provide for enhanced opportunities for interpretation of the benefits of forest management for wildlife habitat, and improve hunting opportunities and, potentially, access.

The ability to use forest management to mimic the natural disturbance paradigm for improving wildlife habitats relies on creating similar size and timing of disturbance that historically occurred on the landscape (Seymour et al. 2002). For long-term effects of different forest regeneration methods on mature forest birds, less intense harvests had positive effects on more forest bird species than intense harvests and a variety of regeneration methods will benefit the most forest birds (Perry et. al. 2017). Implementing thinning at intervals across landscape scales to develop different seral stages and stand-structures, while also maintaining un-thinned areas for species negatively impacted by thinning, will likely have the greatest positive impact on beta diversity of birds in managed plantation landscapes (Cahall et al. 2013).

Using commercial tree harvest, the average forest age/size class and canopy closure would increase over the long term, while still maintaining different age classes on the landscape. The softwood component of the refuge's forest matrix would also increase. With an emphasis on managing for mature closed-canopy conditions, habitat connectivity for forest-interior species would increase.

Overall, we will minimize or avoid long-term, adverse impacts by placing seasonal restrictions on harvesting to avoid disturbing wildlife and damaging trees or understory vegetation, through the careful layout of skid trails, by using mechanical harvesters to reduce rutting and minimize the operation's footprint and conducting pre-harvest surveys of priority species and ecosystems. We would also conduct post-harvest assessments of vegetation and infrastructure, such as skid and truck roads, to ensure the impacts are minor and outweighed by the benefits of achieving desired forest conditions. Depending on the prescribed silviculture, contractors would leave tops, branches and other downed wood on site when appropriate.

Public Review and Comment

The draft compatibility determination will be available for public review and comment for 30 days from September 28, 2024 to October 28, 2024. The public will be made aware of this comment opportunity through a posting at refuge headquarters and local town offices. The State of Maine, and all federally recognized tribes in the area will be asked to review this draft. A copy of this document will be posted at the Refuge Headquarters located at 103 Headquarters Road, Baring, ME 04694. It will be made available electronically on the refuge website https://www.fws.gov/refuge/moosehorn/. Please contact the Refuge Manager for this document if a paper copy is needed. Information or concerns received during the public comment period will be addressed in the final document.

Determination

Is the use compatible?

Yes

Stipulations Necessary to Ensure Compatibility

To ensure commerical tree harvest remains compatible and to minimize adverse effects on soils, wildlife, and plants, the refuge will:

1. Restrict commercial tree harvest on hydric soils, steep slopes, and other sensitive areas.
2. Conduct harvests only during periods when the ground is frozen or dry enough to support tree harvesting equipment without causing long-term, adverse impacts. This will be determined by the refuge manager, wildlife biologist, or forester.
3. Conduct harvests to minimize or avoid adverse impacts to breeding migratory birds and Northern long-eared and Tricolored bats by prohibiting tree harvesting between April 1 and August 15. The refuge manager reserves the right to review and update these dates as climate change requires flexibility to achieve management objectives. The manager may also temporarily suspend operations if serious, adverse impacts are likely to occur.
4. Conduct thorough assessments of the management area when the forest floor can be seen and plants can be identified to ensure skid trails (to the extent possible) avoid important habitat features and micro-habitats such as snag and cavity trees, coarse woody material, and vernal pools.

Justification

The stipulations above would help ensure that commercial tree harvesting is compatible at Moosehorn NWR. This use, as described above, would not conflict with federal law and policy to maintain the biological diversity, integrity, and environmental health of the refuge. Based on available science and best professional judgment, the Service has determined that commercial tree harvesting at Moosehorn NWR, in accordance with the stipulations provided and regulation governing economic uses of refuges, would contribute to the achievement of the National Wildlife Refuge System mission and the purposes of Moosehorn NWR by helping to meet species and habitat objectives, particularly for forest-dependent migratory birds.

Signature of Determination

Refuge Manager, Signature and Date

Signature of Concurrence

Assistant Regional Director, Signature and Date

Mandatory Reevaluation Date

2033

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Figure(s)

Figure 1. Map of Baring Division, Moosehorn National Wildlife Refuge.

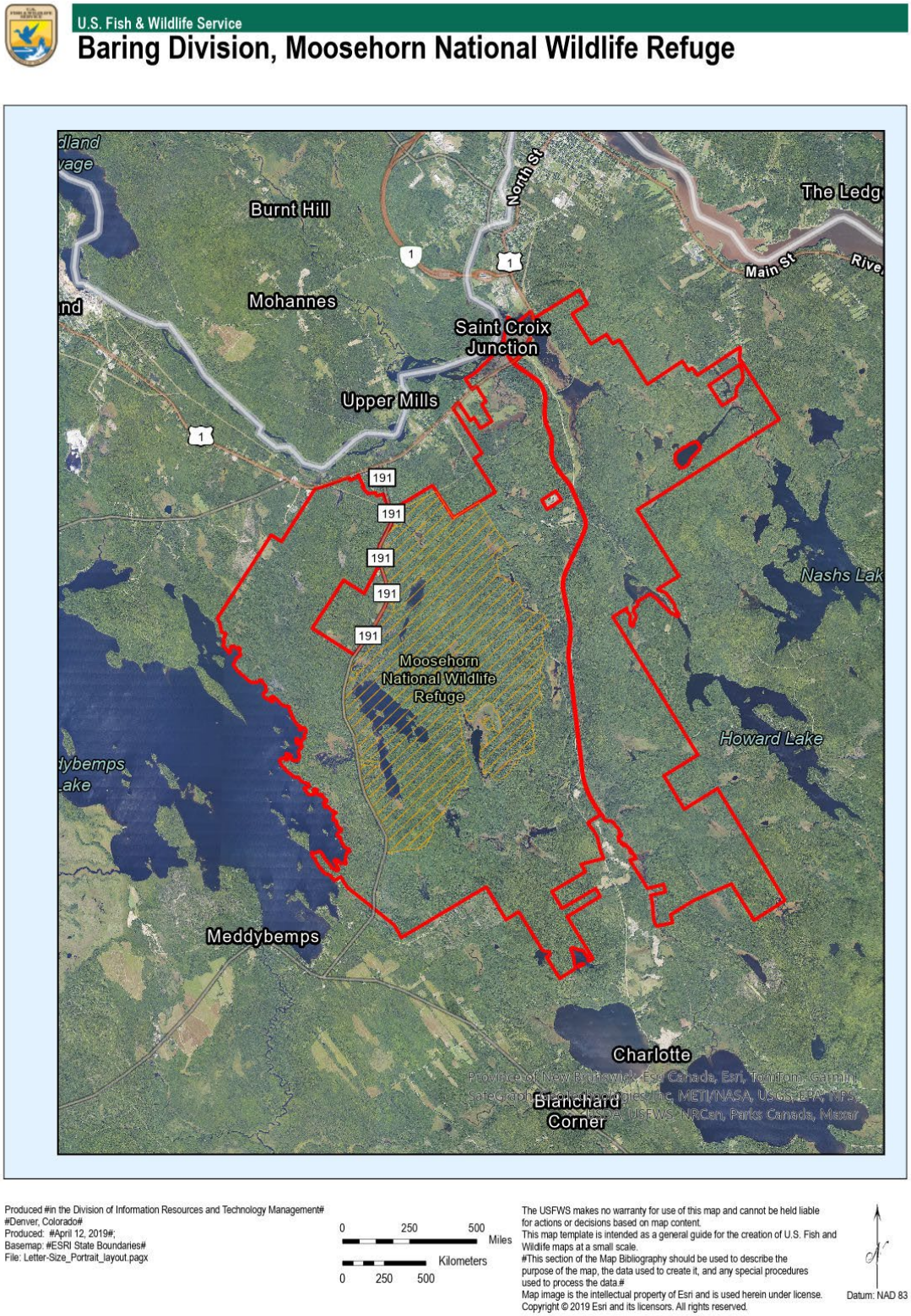

Figure 2. Map of Edmunds Division, Moosehorn National Wildlife Refuge.